

**Beef Slaughter Plant Application**

Carcass after removal of hide

Post skinning wash

**Inhibitor or Microbial Blocking Agent (carrageenan or CMC or dextran sulfate) dispensed in a spray box**

Evisceration

Splitting

Final wash  
(water spray)

**Removal of bacterial contamination with  
arginine and Tween 80/NaCl or phosphate buffer with Tween/NaCl**

Chill

Fabrication

Trimming; Primals

**Inhibitor or Microbial Blocking Agent (carrageenan or CMC or  
dextran sulfate) dispensed as spray or immersion**  
**(Anti-bacterial compound may also be incorporated)**

Packaging

Distribution, retailing

FIG. 1

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**Poultry (Chicken) Slaughter Plant Application**

Kill Room

Scalding/defeathering

Evisceration

Chlorination

(high pressure chlorinated water jets thoroughly clean the entire bird)

Inspection

(for fecal contamination before chilling)

Chilling

(The birds body temp is about 98° F and must be lowered to 40° F or below before processing. Birds are sent to soak in the chiller for 73 minutes. Each chiller holds 20,000 gals. of chlorinated water.)

**Inhibitor or Microbial Blocking Agent (carrageenan or CMC or dextran sulfate) dispensed in a spray box**

Grading

Birds are rehung in shackles to be graded.

Packaging of Whole Birds

or

Cut-up

**2nd Inhibitor or MBA (carrageenan or CMC or dextran sulfate) application to cut-ups**

(anti-bacterial agent such as Cetyl Pyridium Chloride may be added)  
[MBA= Microbial Blocking Agent; CMC= carboxy methyl cellulose]

Boning and trimming

Packaging of cut-up parts

**FIG. 2**

**Swine Slaughter Plant Application in Clean Room**

Shaving

Carcass Washing

Head Removal, Brisket sawing, Debunging

Carcass Opening

Evisceration

Carcass Splitting

Trimming

Stamping

Final Carcass Washing  
(spraying with room temp. water)

**Inhibitor or Microbial Blocking Agent (carrageenan or CMC or  
dextran sulfate) dispensed in a spray box**  
(also prevents dehydration)

Chilling  
(dry air blast at 2 degrees, overnight)

Cutting

**Inhibitor or MBA (carrageenan or CMC or dextran sulfate) application**  
(anti-bacterial agent such as Cetyl Pyridium Chloride may be added)  
[MBA= Microbial Blocking Agent; CMC= carboxy methyl cellulose]

Packaging or Processing

FIG. 3

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**Detachment for Sampling**  
**[Laboratory Analysis]**

**Coat tissues with Inhibitor or Microbial Blocking Agent  
(Carragenan, CMC or dextran sulfate)**

**Detach bacteria**  
**Guanidine-HCl, pH 4.8**  
**or**  
**Phosphate buffer-NaCl-Tween 80**

**Enrich bacterial growth**

**Analyze bacteria using**

- 1. Traditional Plate Method**  
**or**
- 2. Isolate target bacteria**  
**immunomagnetic beads**  
**or**  
**imuno-affinity silica gel**  
**or**
- 3. Biosensor screening (BIAcore, etc.)**  
**or**
- 4. Other microbial screening and testing methods**

**FIG. 4**

**Detachment for *In Situ* Sampling in  
Slaughter Plants**

**Spray a 300 cm area with Carrageenans,  
or Carboxy methyl Cellulose or dextran sulfate**

**Spray same area with arginine  
to loosen the bound bacteria**

**Soak sponge with  
0.05% Tween 80 (Span 80) and 1% NaCl  
or  
phosphate buffer with NaCl and Tween 80**

**Wipe off bacteria from treated surface  
with pre-soaked sponge  
or  
with filter paper (e.g. cellulose or polycarbonate membranes)  
or  
with vacuum (with filter) to remove bacteria from carcass surface  
remove vacuum filter for entrapped bacteria**

**Enrich or Extract bacteria from sponge or filter or membranes**

**Analyze bacteria with  
1. Traditional Plate Methods  
or**

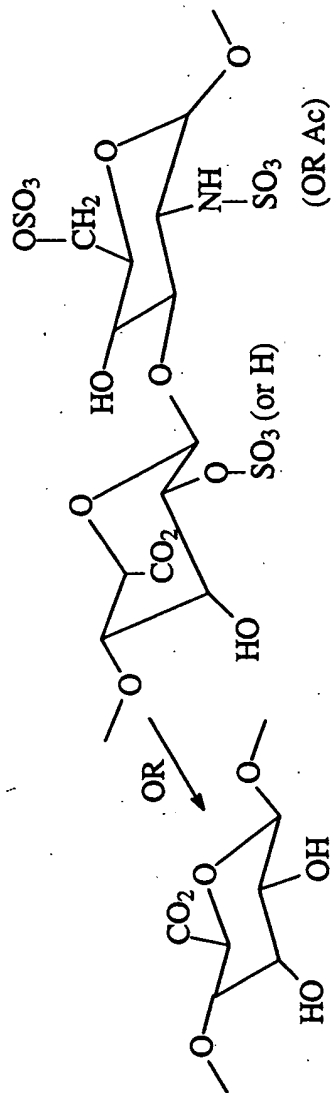
**2. Isolate target bacteria  
with immunomagnetic beads  
or**

**3. Biosensor screening (BIAcore, etc.)  
or**

**4. Other microbial screening and testing methods**

**FIG. 5**

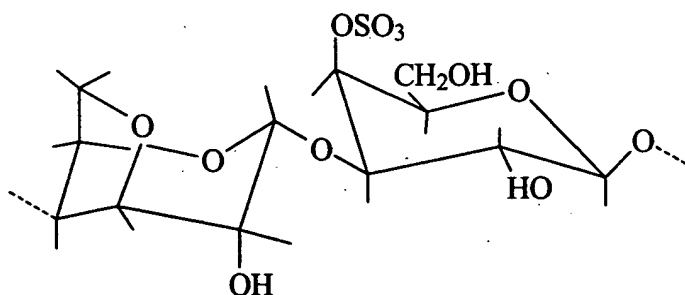
# Heparan Sulfate



-[glucuronate- $\beta$  1,4...]-[iduronate-2 sulfate- $\alpha$ 1,4 N-sulfate glucosamine-6-sulfate  $\alpha$  1,4]-

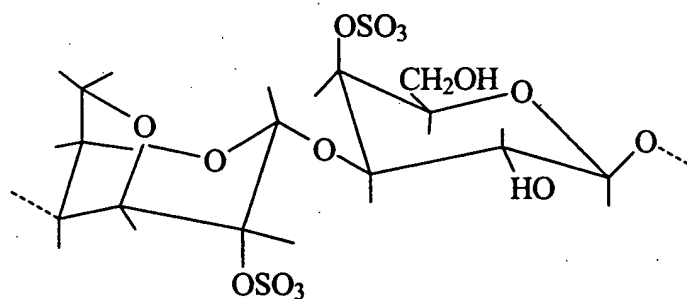
FIG. 6A

### Kappa Carrageenan



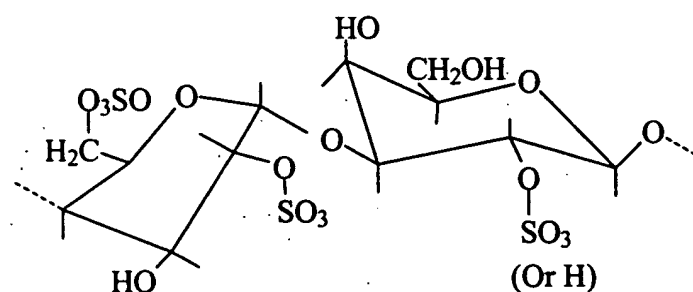
3,6-anhydro-D-galactose D-galactose-4-sulphate

### Iota Carrageenan



3,6-anhydro-D-galactose-2-Sulphate D-galactose-4-sulphate

### Lambda Carrageenan



D-galactose-2,6-disulphate D-galactose-2-sulphate

FIG. 6B

FIG. 7A

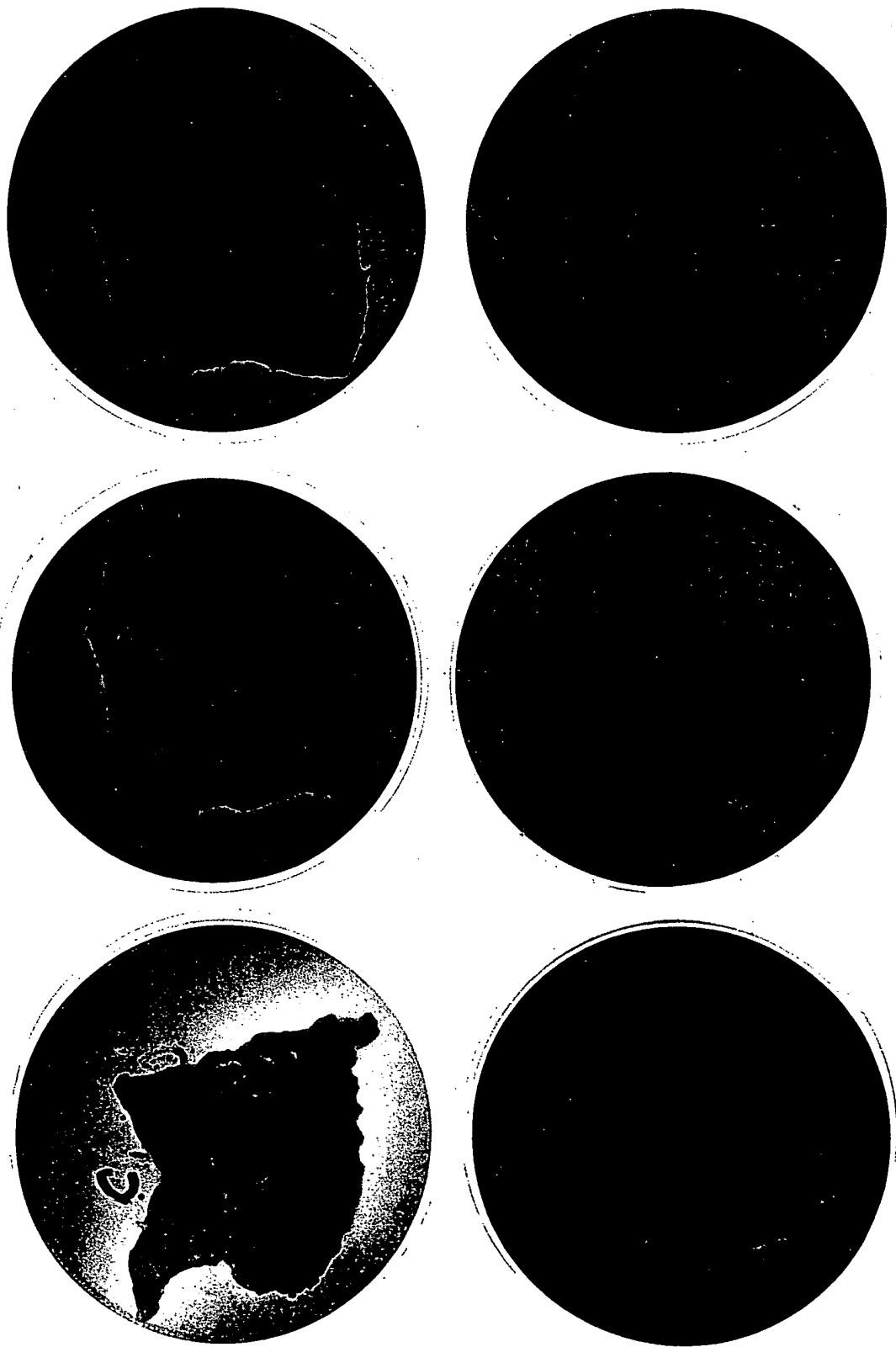


FIG. 7A



FIG. 7B

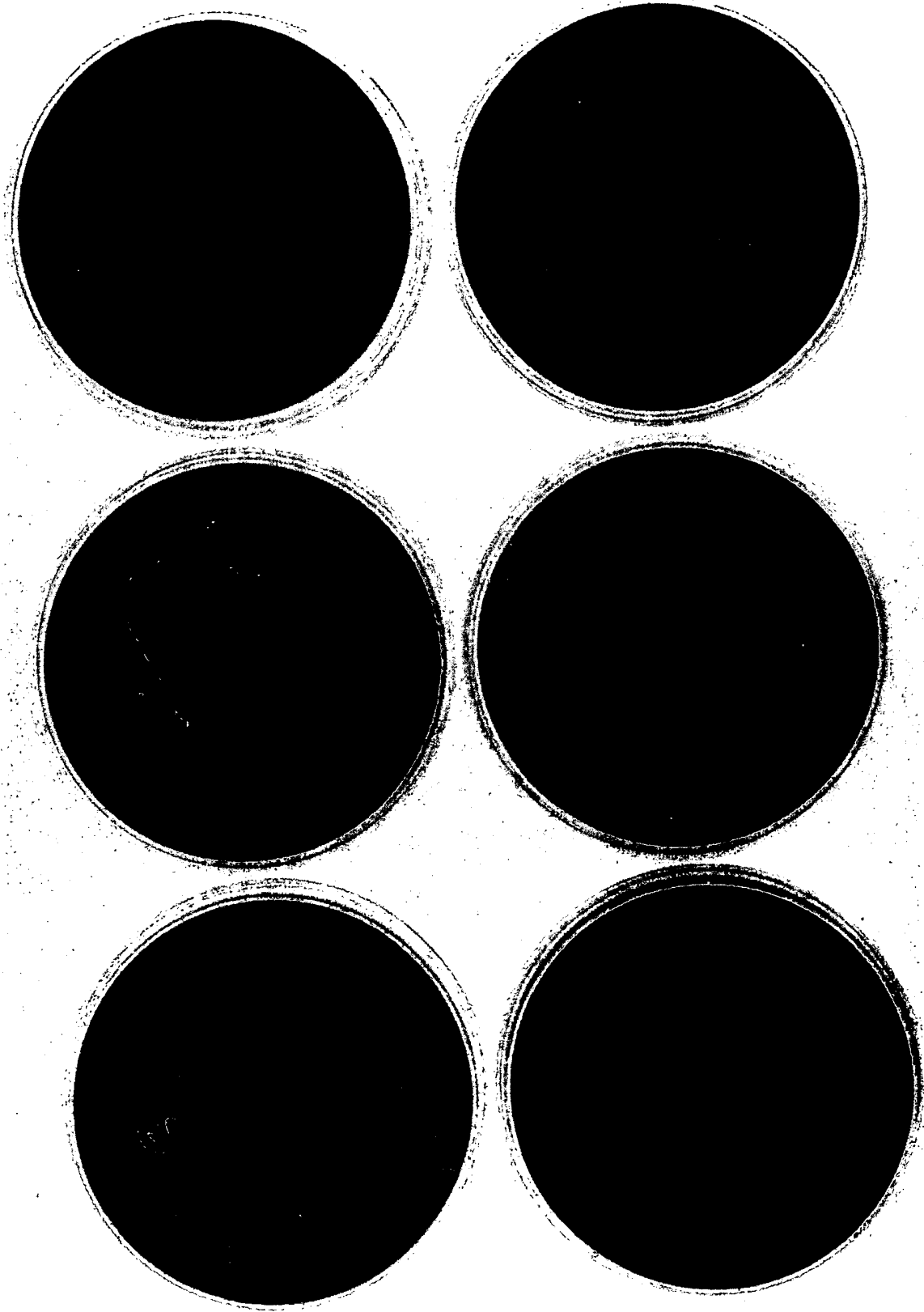


FIG. 7B

FIG. 8A



FIG. 8A

FIG. 8B

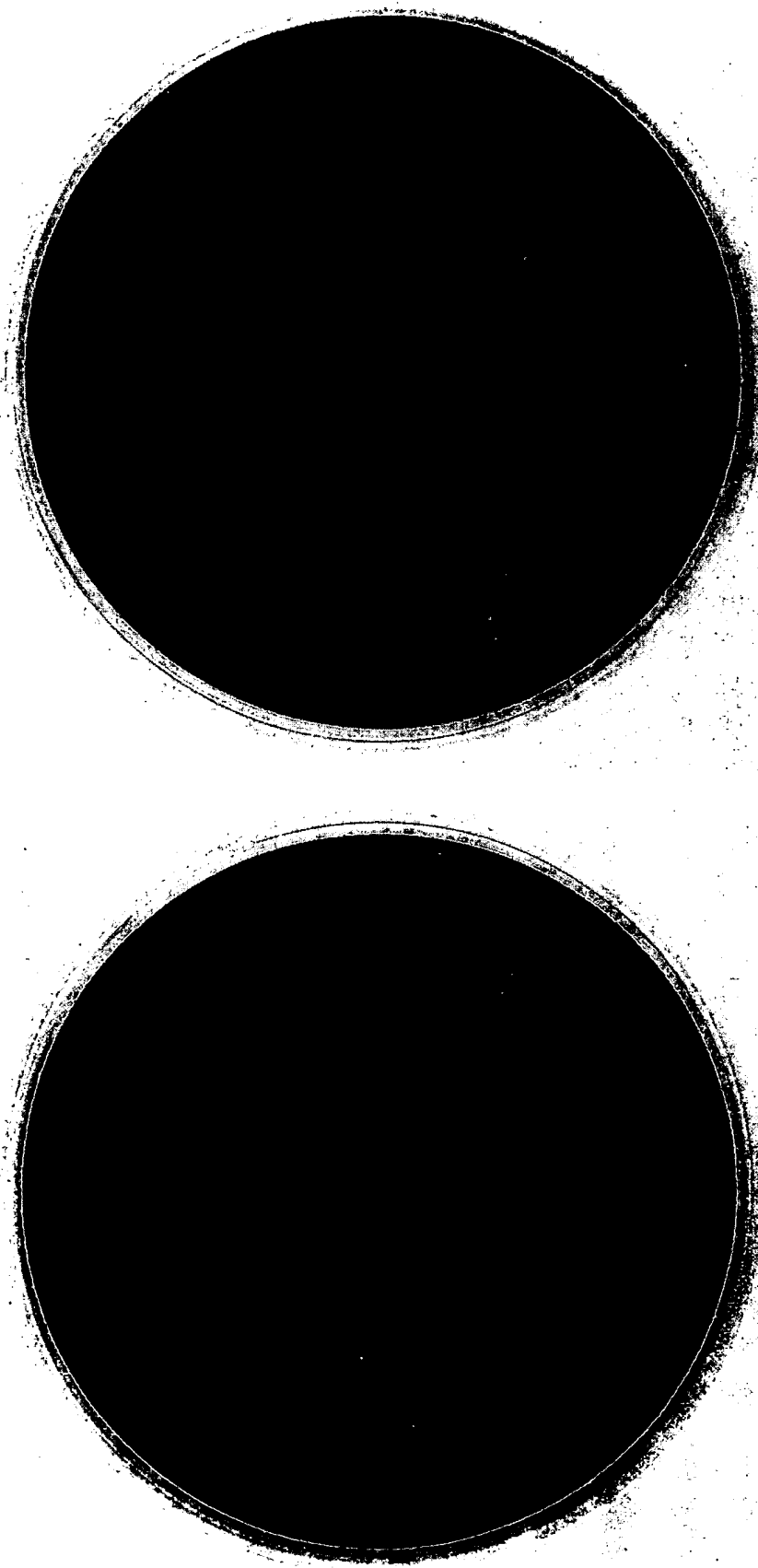


FIG. 8B

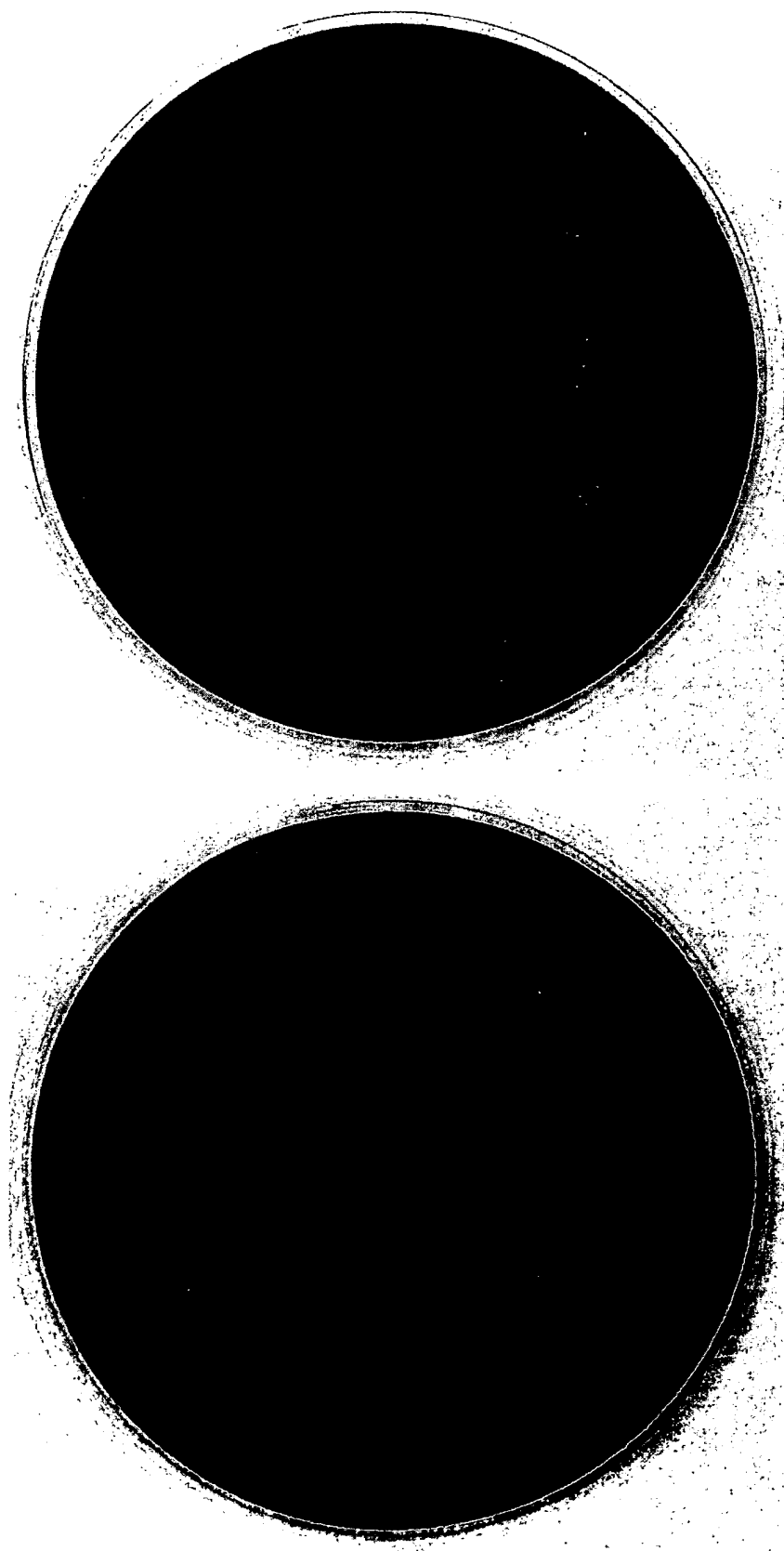


FIG. 8C

FIG. 8D

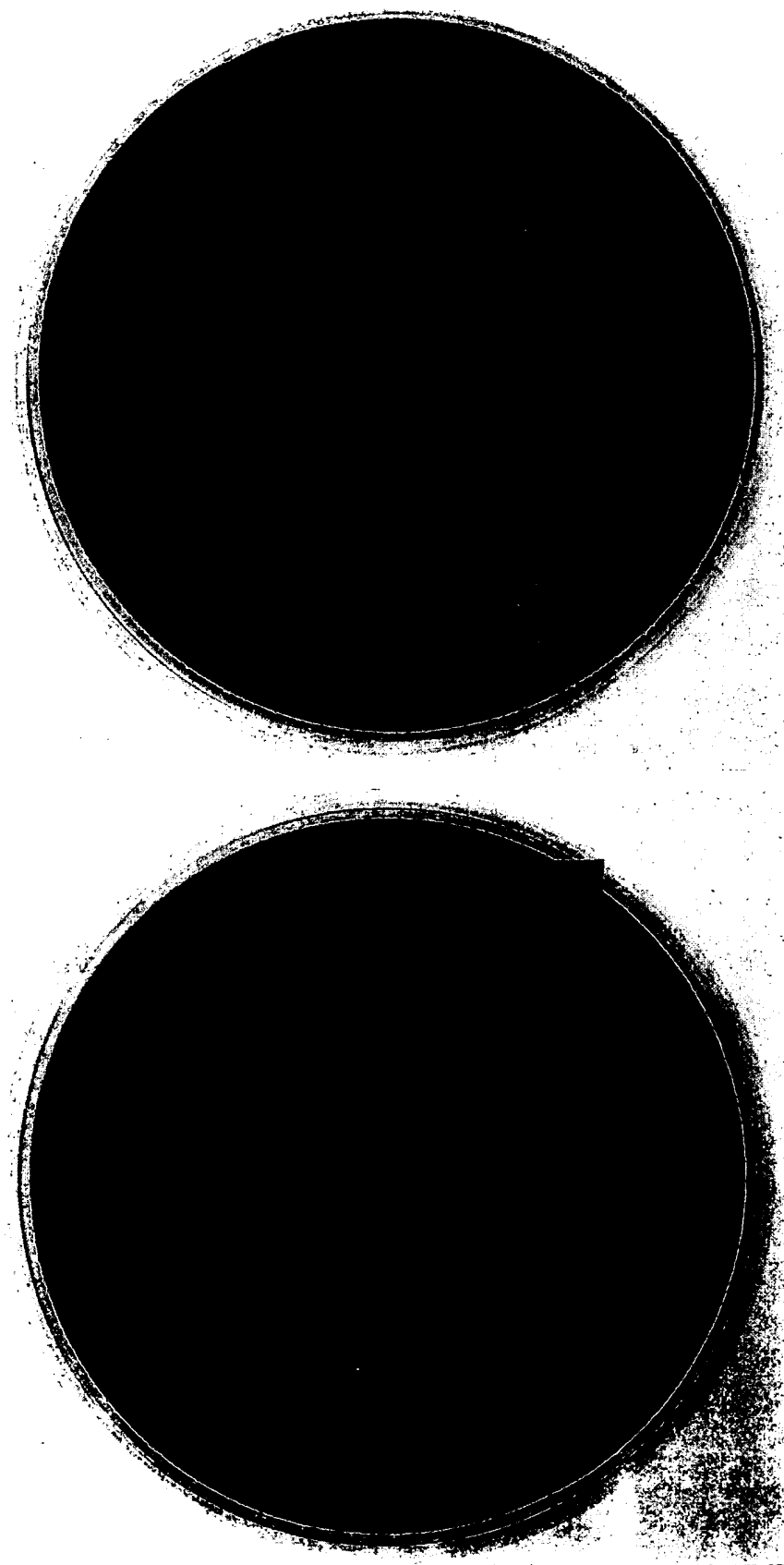


FIG. 8D

FIG. 8E



FIG. 8E

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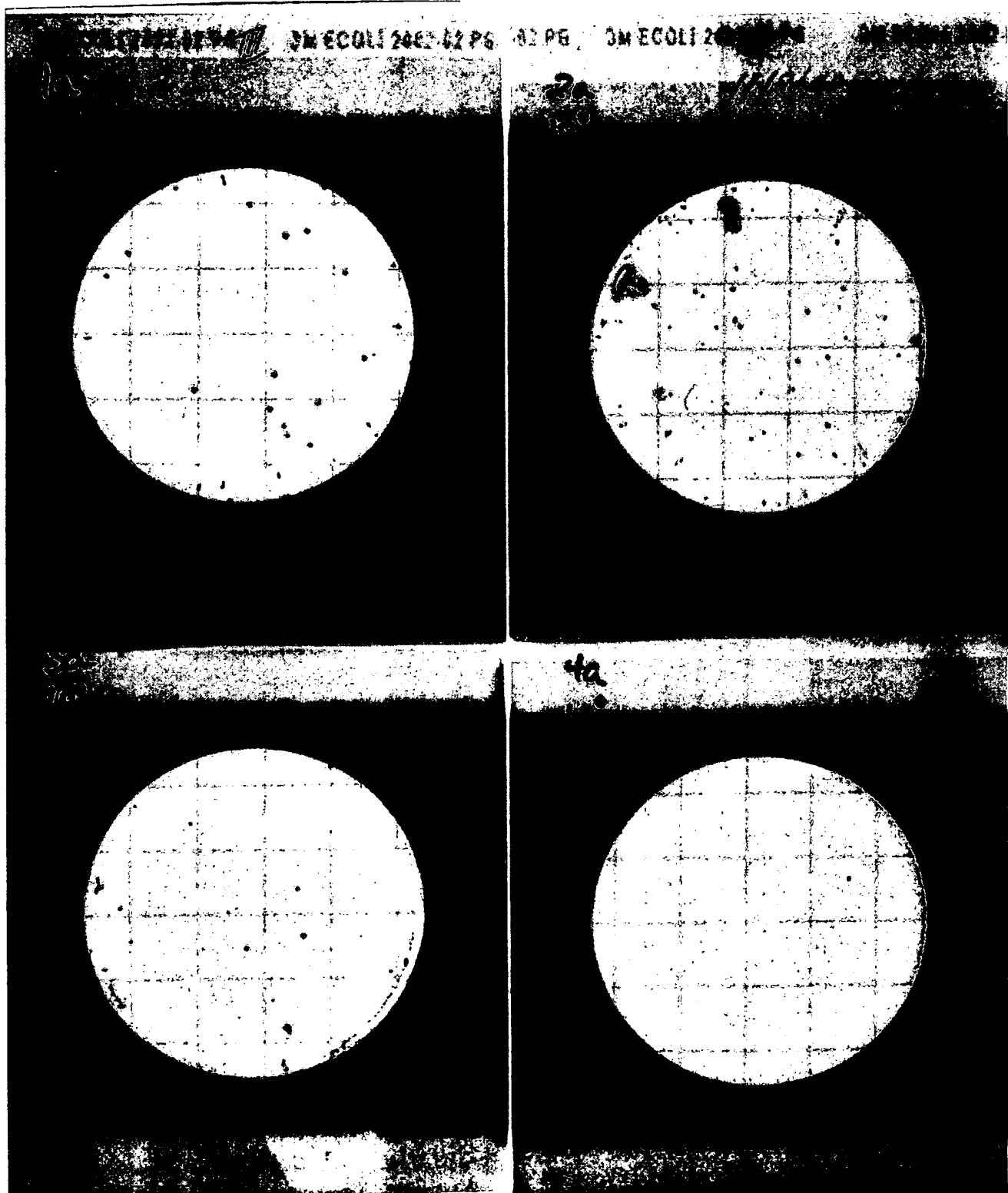


FIG. 9A

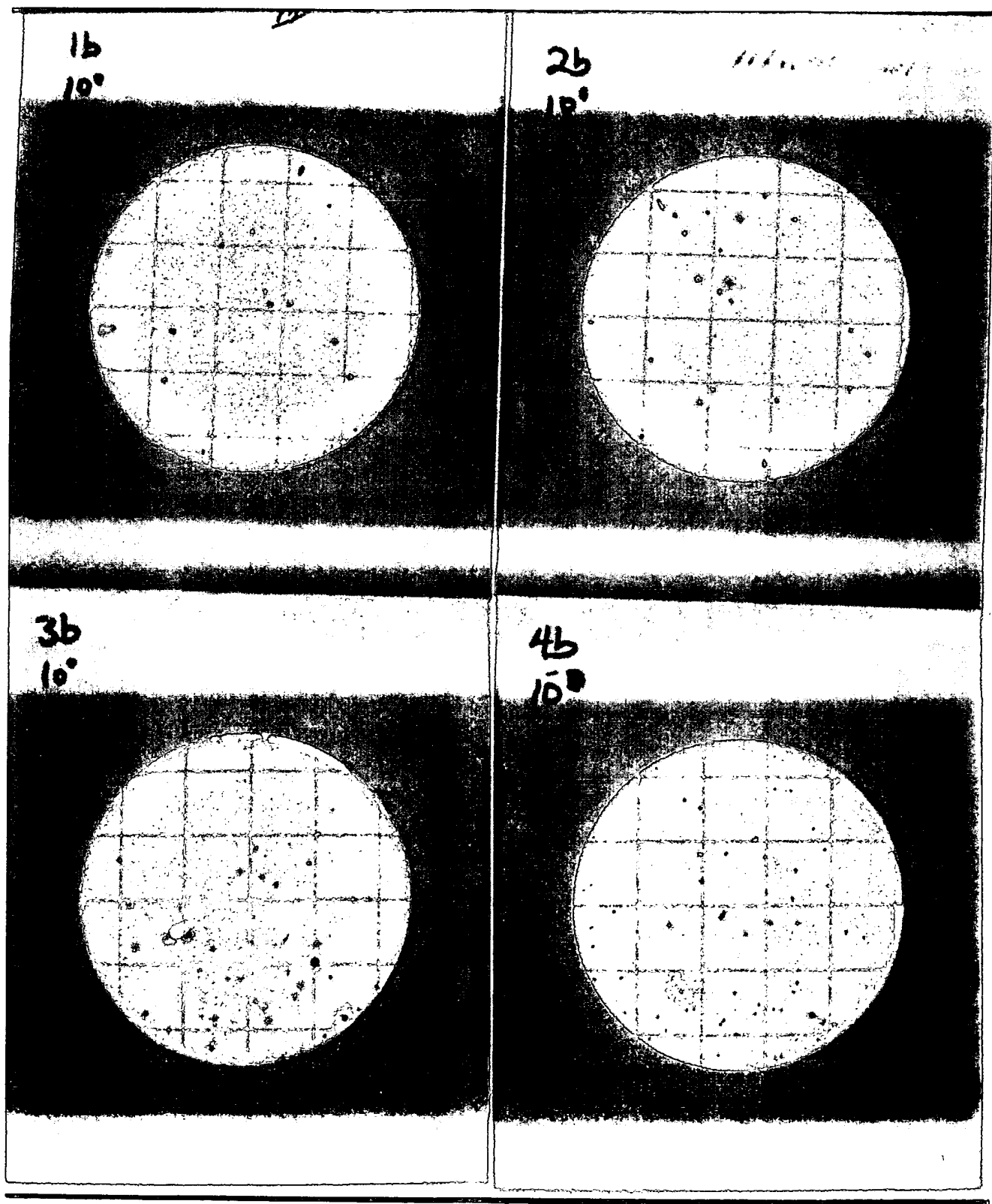


FIG. 9B



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